

Jan. 15, 1952

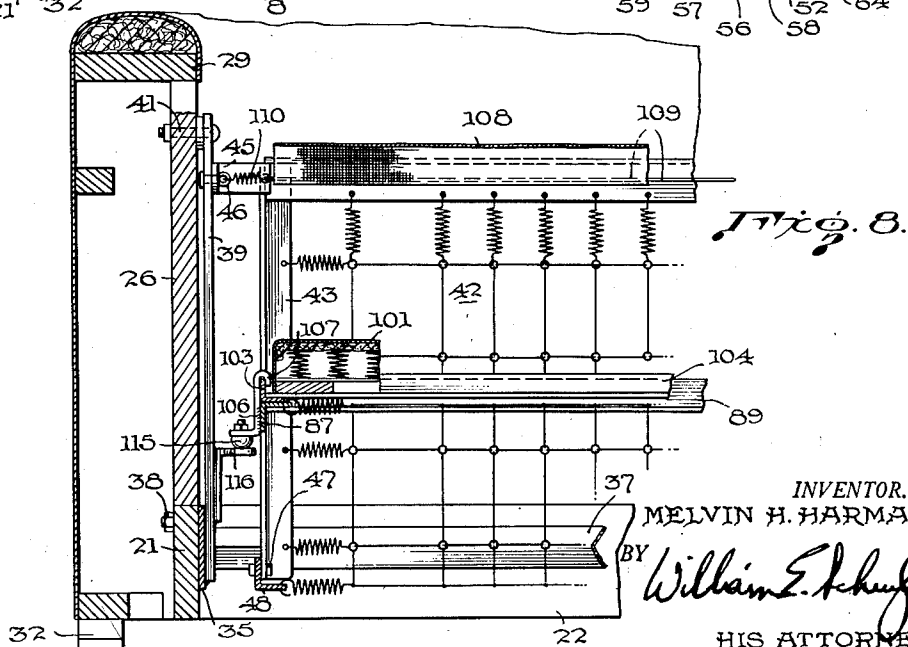
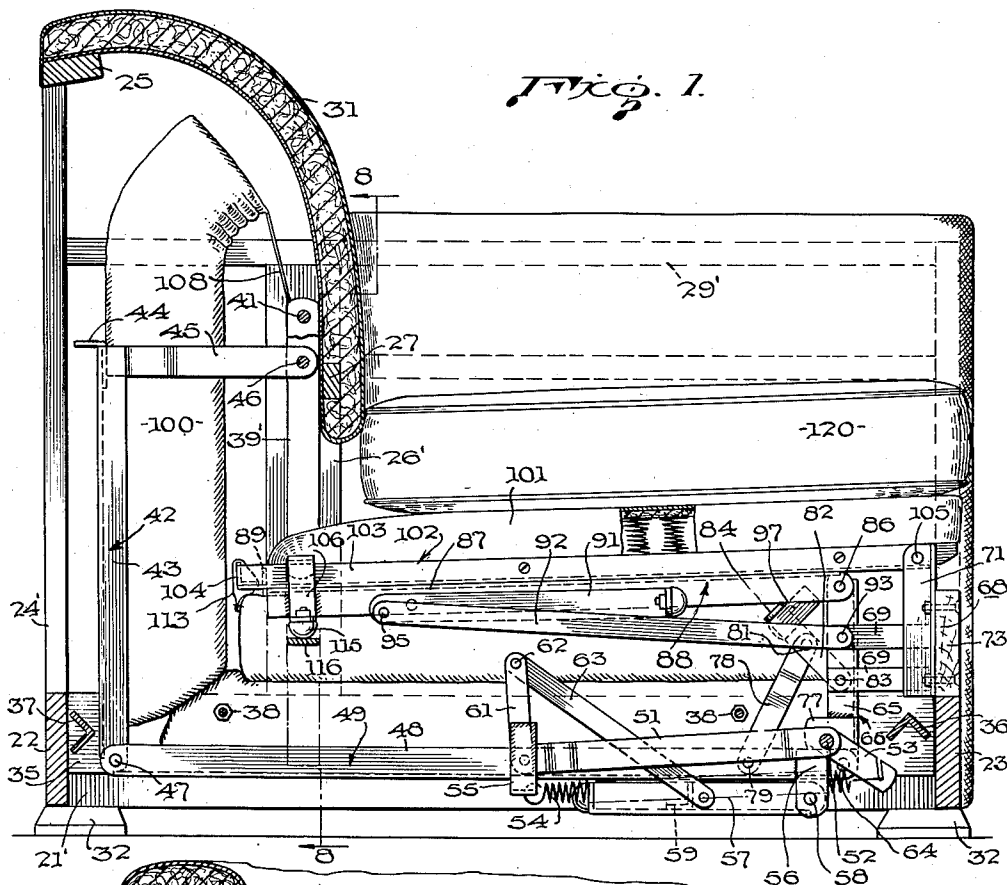
M. H. HARMAN

2,582,904

FOLDING SPRING UNIT FOR SOFA BEDS

Filed Feb. 10, 1949

7 Sheets-Sheet 1



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7 Sheets-Sheet 2

Fig. 2.

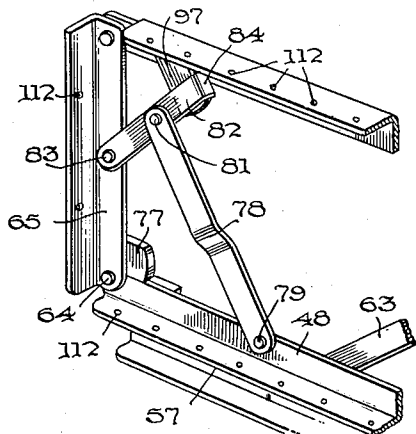
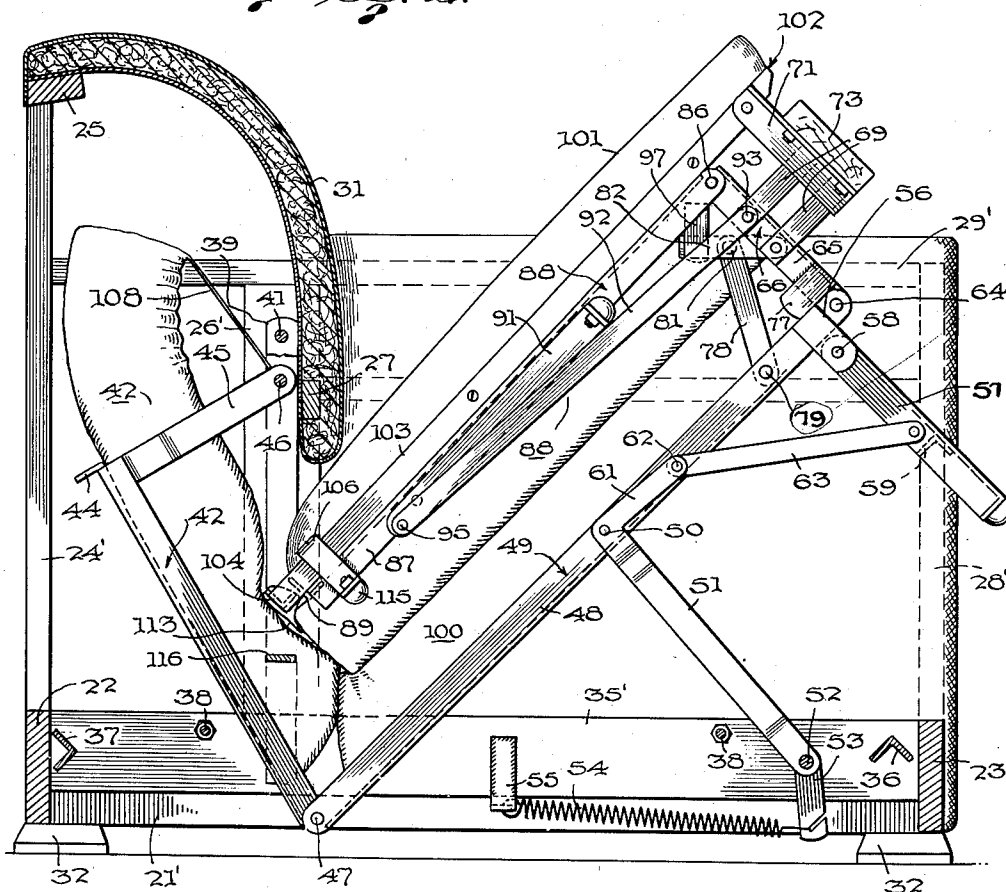


Fig. 9.

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7 Sheets-Sheet 3

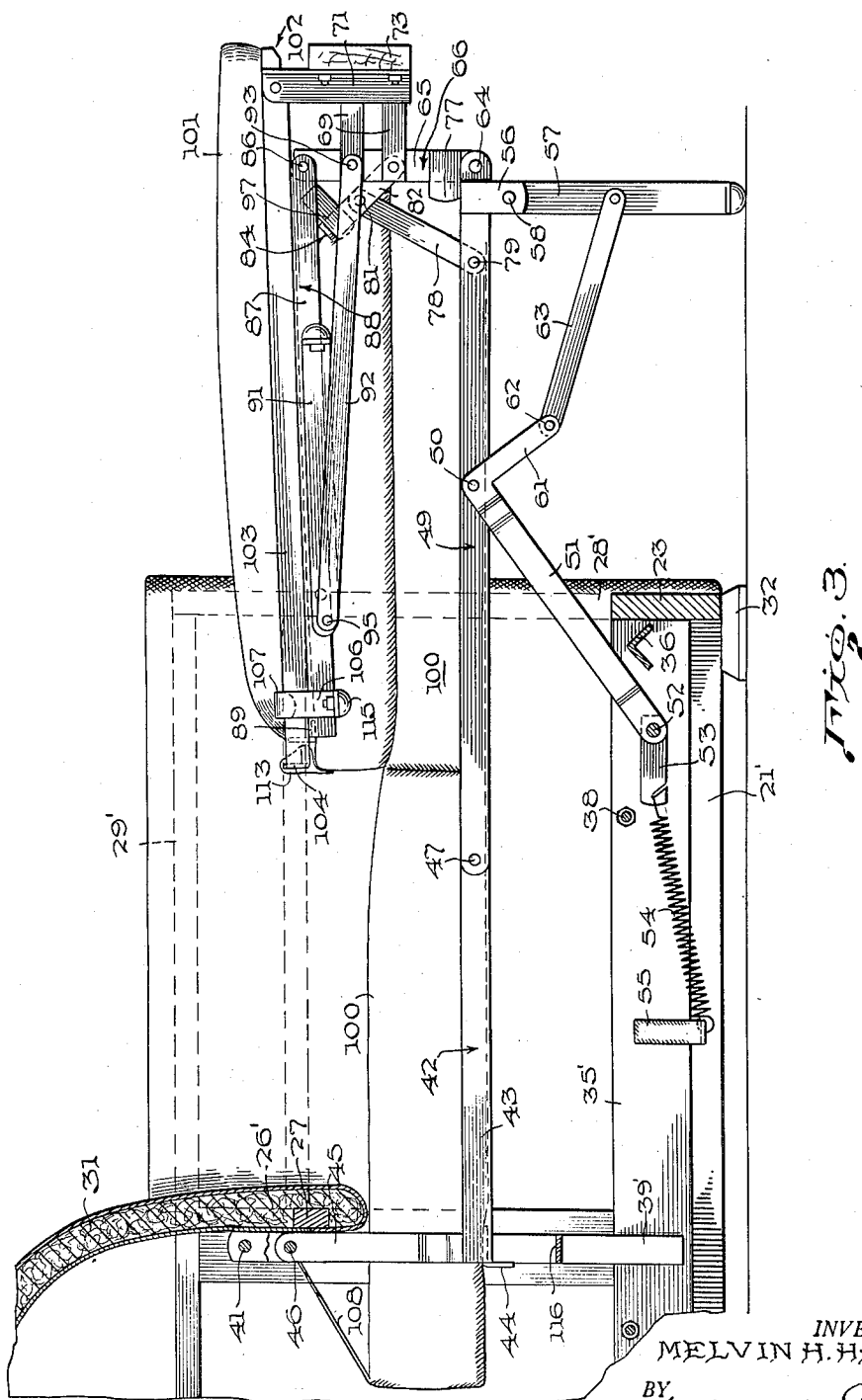


Fig. 3.

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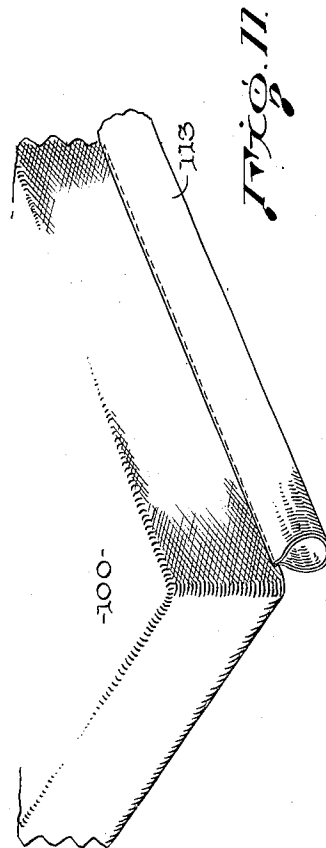
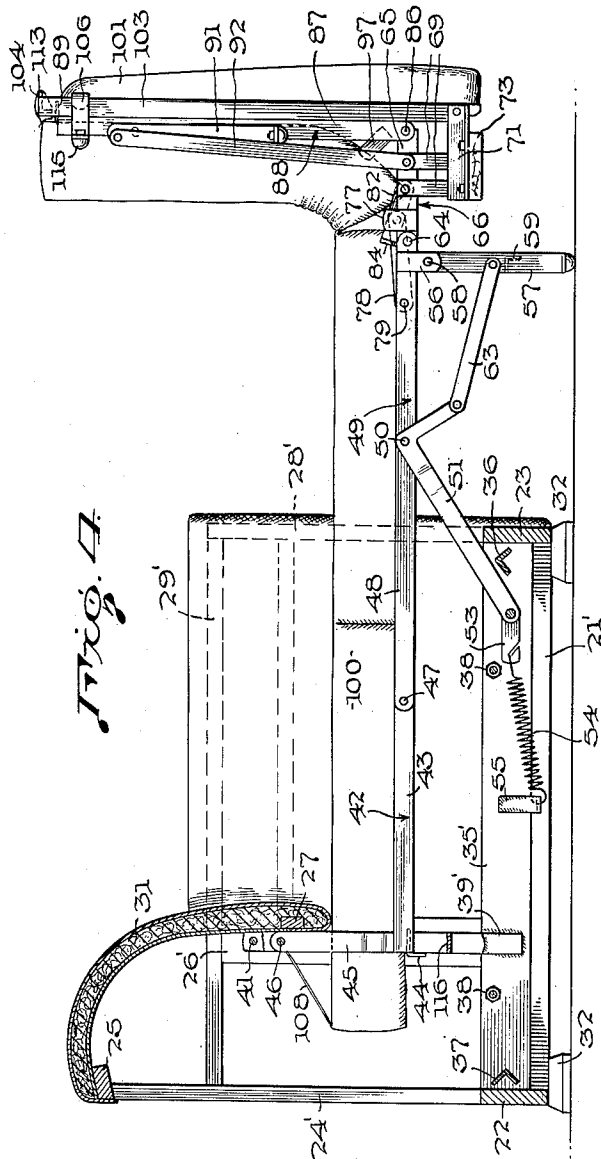
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7 Sheets-Sheet 4



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FOLDING SPRING UNIT FOR SOFA BEDS

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7 Sheets-Sheet 5

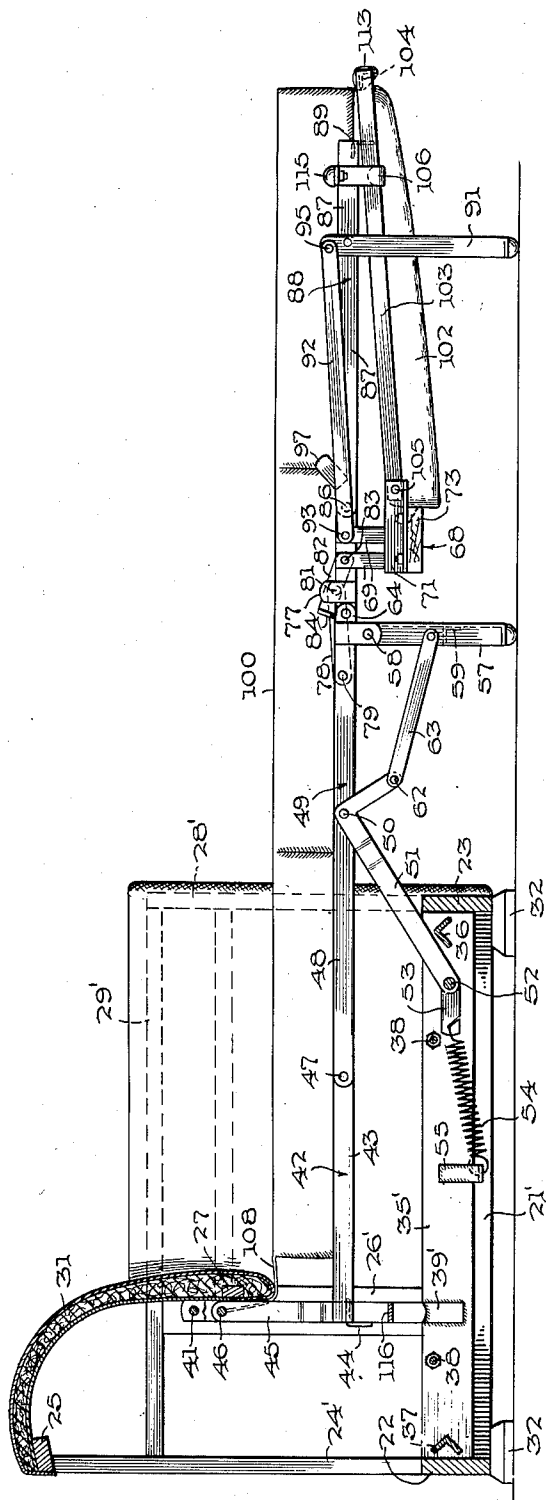


Fig. 5.

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2,582,904

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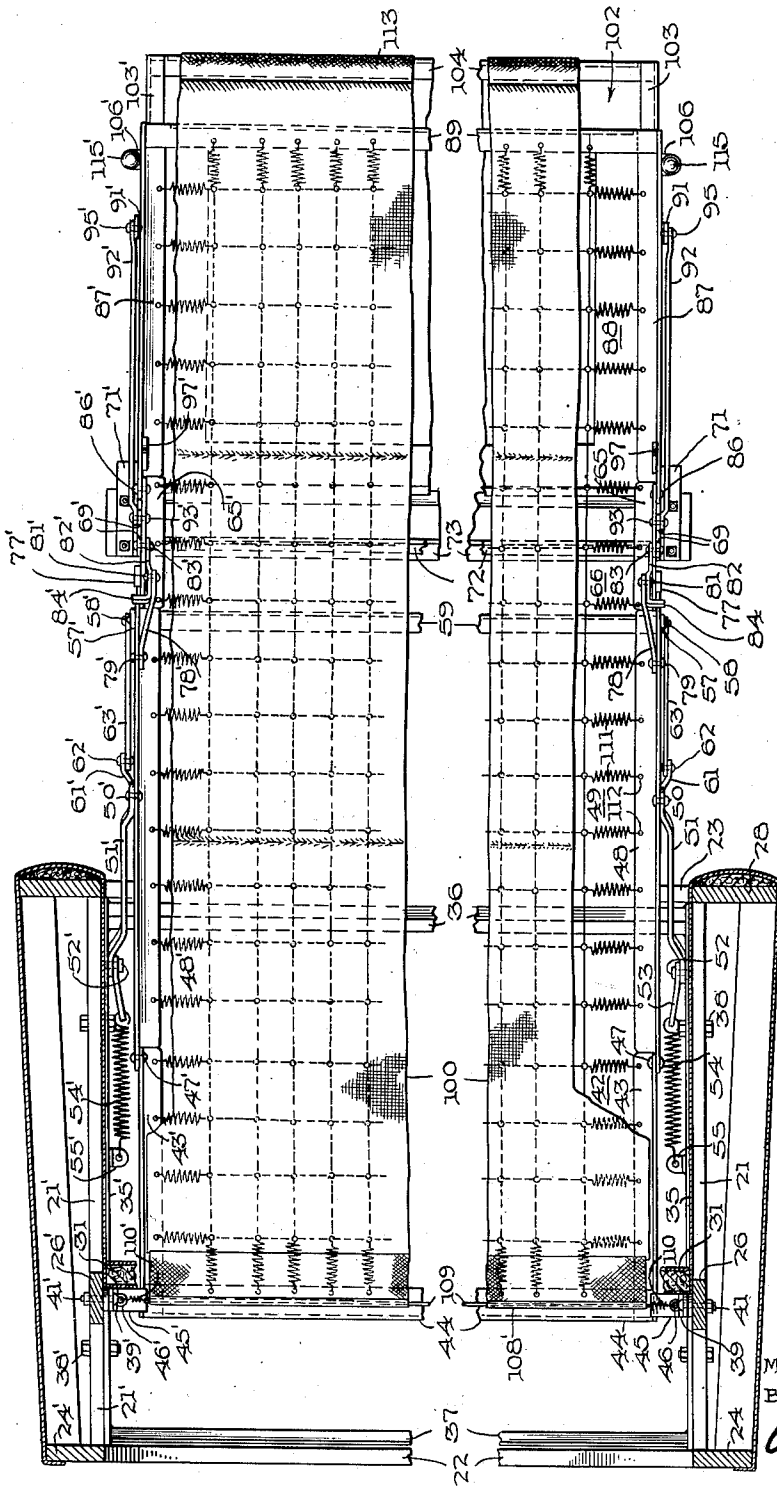


Fig. 6.

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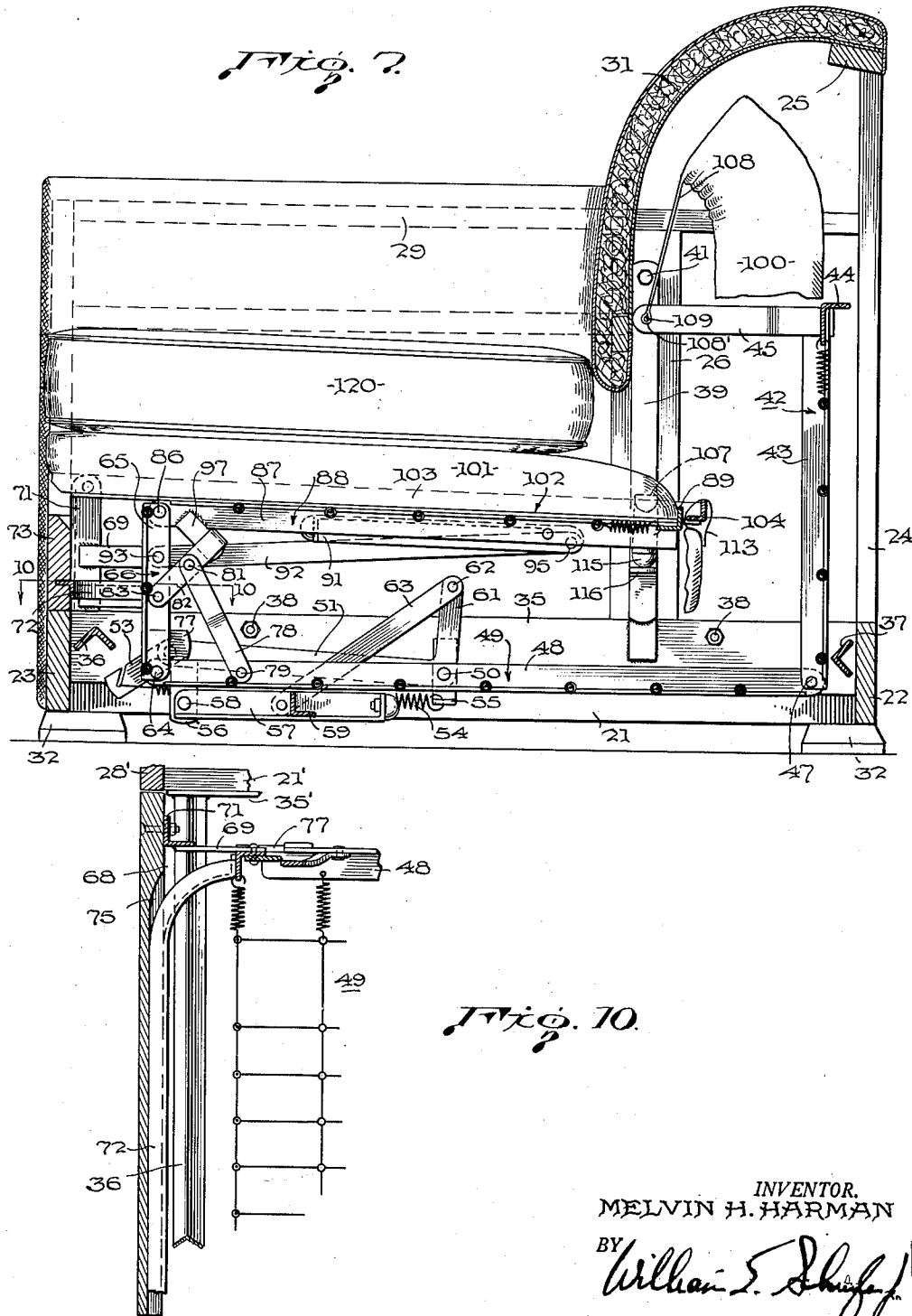
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FOLDING SPRING UNIT FOR SOFA BEDS

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UNITED STATES PATENT OFFICE

2,582,904

FOLDING SPRING UNIT FOR SOFA BEDS

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Application February 10, 1949, Serial No. 75,605

17 Claims. (Cl. 5—29)

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This invention relates to a foldable spring unit for a sofa bed and concerns an improved folding spring unit of the type in which the longer dimension of the bed extends substantially normal to the back of the sofa.

Modern sofas and love seats are not sufficiently wide to provide a folding bed spring with its major dimension between the side arms. In efforts to provide a full length bed spring to support a 74 inch mattress, the spring has been folded on the axes of transverse pivots so the longer dimension of the bed spring extends outwardly from the back of the sofa. The most satisfactory of these springs has three major sections, pivoted together, and swingably supported on a frame so they may be folded within the confines of the sofa or unfolded in co-planar relation to form a bed spring.

Usually, one of the three sections of the spring swings into a vertical position behind the sofa back. The remaining two sections are folded one above the other and positioned below the sofa seat. Even with these types of springs, to fold a full size spring into the available space, it has been necessary to provide the sofa with a removable seat cushion and in some instances with a removable back panel. Such a seat cushion cannot have the spring construction of the conventional sofa. Furthermore, the folded mattress and the under side of the folded bed spring must serve as a support for the seat cushion. This combination does not provide the comfort customarily found in a conventional sofa. In such a structure, the removable cushion invariably rests upon a rigid cross rail at the front of the sofa instead of the "spring-edge" present in the ordinary sofa.

It is a major object of this invention to provide in a sofa having customary comfort, a full size foldable bed spring. More particularly, an object of this invention is to provide a sofa with a fixed seat spring and a full size bed spring foldable into the sofa without affecting the seating comfort of the sofa. Another object of the invention is to provide a sofa bed in which a removable seat cushion rests upon a seat spring having a "spring-edge" across its front.

In accordance with these objects, one important feature of the invention resides in the arrangement of a seat spring frame on one section of the bed spring to support conventional springs, such as coil springs, below a removable seat cushion. Another feature of the invention resides in the automatic extension movement of the seat spring frame providing an elongated bed spring to accommodate a full size mattress. Another im-

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portant feature of the invention resides in the automatic shifting of the seat spring frame below the bed spring as it is unfolded, so the seat frame will not interfere with use of the bed spring. Still another feature of the invention resides in the arrangement of a lock to secure the bed spring in folded position so it affords a sturdy support for the built-in sofa cushion with full spring construction.

Other objects and advantages will become apparent from the following specification, taken in connection with the accompanying drawings wherein like numerals designate like parts throughout the several views and sectional views are taken in the direction of the arrows on the section lines:

Figure 1 is a vertical section through one end of a sofa bed embodying a preferred form of the invention, showing the bed spring folded to its seat position;

Fig. 2 is a similar view, but showing an initial step in unfolding the bed spring;

Fig. 3 is a similar view, but showing two sections of the bed spring unfolded to bed position;

Fig. 4 is a similar view, but showing a still further step in unfolding the bed spring;

Fig. 5 is a similar view, but showing the bed spring unfolded to its bed position;

Fig. 6 is a partial top plan view of the sofa bed with the spring arranged as shown in Fig. 4;

Fig. 7 is a view like Fig. 1, but looking in the opposite direction;

Fig. 8 is a transverse section taken on the line 8—8 of Fig. 1;

Fig. 9 is a fragmentary perspective view showing the pivotal connections of the connecting bed spring section with the locks therefor;

Fig. 10 is a partial horizontal section taken on the line 10—10 of Fig. 7; and

Fig. 11 is a fragmentary perspective view of a mattress to be used with the invention.

In its preferred form, the folding sofa bed spring unit embodying the invention has a base frame adapted to be secured at the bottom of a sofa framework. The folding bed spring has three main sections, the rear section and intermediate section being pivoted together, and the front section and intermediate section each being pivotally connected to a short connecting section. When in seat position, the rear section is vertically disposed behind the sofa back panel, the intermediate section is horizontally disposed below the sofa seat, the connecting section is vertically disposed along the front of the sofa below the seat, and the front section is superimposed upon the intermediate section. A

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seat spring frame rests upon the front section to carry a stationary seat spring not normally available in a sofa bed. The mattress has its front end connected to the seat frame and is folded double beneath the seat with its rear portion extending vertically upwardly behind the sofa back and projecting above the rear bed spring section. A lock is provided between the front section and the connecting bed spring section to retain the seat spring frame in seat position with the folded portion of the mattress compressed below the seat.

When the folding spring unit is opened to bed position, the sections of the bed are horizontally arranged in co-planar relation extending from the sofa back panel outwardly the full length of the bed. In unfolding the front spring unit, the seat spring frame is so moved that it is disposed below the front spring unit and spaced therefrom to provide freedom of action for the bed spring. Also, unfolding of the front spring section to bed position slides the seat frame forwardly relative to the front bed spring section, and, since the mattress is secured to the seat spring frame, it is pulled forwardly so the portion projecting above the rear spring section is moved onto the bed spring. Thus, the seat spring frame effectively elongates the bed spring in a manner which provides a full length bed within the space available for an ordinary sofa.

For a more detailed description of one embodiment of the invention in its preferred form, reference may be had to the accompanying drawings. As shown in these drawings, the sofa has a conventional framework with a rectangular base framework consisting of side rails 21 and 21' connected by a rear rail 22 and a front rail 23. Posts 24 and 24' extend upwardly at opposite sides of the rear rail 22 to support a back crosspiece 25. Intermediate the ends of the sofa framework are arranged vertical posts 26 and 26' extending upwardly from the side rails 21 and 21'. These posts support a back crosspiece 27. At the front ends of the side rails 21 and 21' are arranged front arm posts 28 and 28' which support arm frame members such as that shown at 29. As illustrated in Figure 1, the upholstered sofa back panel 31 extends from crosspiece 25 downwardly to crosspiece 27 forming a chamber behind the back panel 31 and the posts 26 and 26' for purposes to be described. The entire sofa framework may rest on suitable feet 32, 32'.

The folding spring unit of the present invention is adapted to be inserted as a unit into the sofa framework and secured thereto. After the manufacturer has completed the sofa framework, he may place the folding spring unit in position, as shown in the drawings, and secure it to the framework.

Corresponding to the rectangular base framework of the sofa, the folding spring unit has a rectangular base frame including side rails 35 and 35' connected by front rail 36 and rear rail 37. The side rails 35 and 35' of the spring frame may be secured to side rails 21 and 21' of the sofa framework as by bolts 38, 38'. Also, forming a part of the folding spring base frame are posts 39 and 39' extending upwardly from the side rails 35 and 35' between the rear rail 37 and the center of the spring frame. These posts are aligned with the posts 26 and 26' and may be secured thereto as by bolts as indicated at 41.

As previously outlined, the folding spring in-

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cludes a rear section 42 having sides 43 and 43' connected at their rear ends by a rear crosspiece 44. Affixed to opposite sides of the rear end of the rear spring section are arms 45 and 45' extending normal to the plane of the rear spring section and pivotally connected, as by pivot 46, to posts 39 and 39' near the upper ends thereof. The forward ends of sides 43 and 43' of the rear spring section 42 are pivotally connected at 47 and 47' to sides 48 and 48' of intermediate bed spring section 49. Pivotally connected at 50 and 50' near the centers of the sides 48 and 48' of the intermediate bed spring section are supporting links 51 and 51' having their lower ends pivoted at 52 and 52' to the side rails 35 and 35' of the folding spring base frame. Fastened to the links 51 and 51' at the pivots 52 and 52' are spring levers 53 and 53'. Suitable coil springs 54 and 54' are respectively connected between the free ends of spring levers 53 and 53' and lugs 55 and 55' secured near the center of the side rails 35 and 35'. Near the forward ends of sides 48 and 48' are lugs 56 and 56' to which legs, such as leg 57, are connected by pivots 58 and 58'. The legs are connected together by a crosspiece 59 arranged intermediate the pivots and the free ends of the legs. Formed integral with the links 51 and 51' at their pivots 50 and 50' are leg operating levers 61 and 61' having their upper ends pivoted at 62 and 62' to links 63 and 63' which are pivoted to the legs adjacent the crosspiece 59. When the rear section 42 and intermediate section 49 of the folding spring unit are in seat position as shown in Figure 1, the rear section has its sides 43 and 43' vertically disposed and spaced rearwardly from the posts 39 and 39' a distance corresponding to the length of arms 45 and 45'. The length of the sides 43 and 43' is so chosen that their forward ends will be near the bottom of the spring base frame so sides 48 and 48' will have their pivots 47 and 47' positioned as near as possible to the lower rear corners of the base frame. The intermediate section 49 thus assumes a horizontal position along the bottom of the base frame with its supporting links 51 and 51' assuming an almost horizontal position extending rearwardly from the stationary pivots 52 and 52'. In this position of the links, spring levers 53 and 53' are turned about the pivots 52 and 52' to extend the coil springs 54 and 54'. Thus, a slight lifting force applied to the folding spring unit will be instantly aided by the force of the springs 54 and 54' to swing the folding spring sections upwardly on the links 51 and 51'. While folded in seat position, links 51 and 51' move the upper ends of leg levers 61 and 61' toward the rear of the intermediate section 49 so links 63 and 63' withdraw the legs to a position against the bottom of the intermediate section 49.

Forward ends of sides 48 and 48' of the intermediate section 49 are pivoted at 64 to sides 65 and 65' of connecting bed spring section 66. This connecting bed spring section 66 has projecting from the plane thereof a bracket 68 including supporting arms 69, 69' extending from side piece 65 as well as arms 69', 69', extending from side 65'. The arms 69, 69', have secured to their outer ends a bracket member 71 and the arms 69 and 69' have secured to their outer ends a bracket member 71'. While the sides 65 and 65' of the connecting section 66 are connected together by a crosspiece 72 the bracket members 71 and 71' may be connected together by a crosspiece 73

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which will extend across the front of the sofa and cooperate with front rail 28 to form the front of the sofa seat. This bracket crosspiece 73 may be of wood in which case it will be provided with a groove 75 to accommodate the projecting flange of crosspiece 72, as shown most clearly in Figures 7 and 10.

When in seat position, as shown in Figure 1, for example, connecting bed spring section 66 has its sides 65 and 65' vertically arranged substantially normal to the plane of intermediate section 49. Thus, arms 69, 69', project forwardly to support bracket member 71 spaced forwardly of the plane of the connecting section 66 so cross member 73 is substantially aligned with the front rail 23 of the sofa framework. Connecting section 66 is held in this vertical position by stop members 77 and 77' projecting from sides 65 and 65' adjacent the ends which are pivoted to intermediate section 49. In this way stops 77 and 77' engage the upwardly projecting flanges of sides 48 and 48' when the connecting section 66 is turned to its seat position.

To retain the connecting section 66 co-planar with the intermediate section 49, when these sections are in their bed positions, a locking device is provided. Links 78 and 78' are respectively pivoted at 79 and 79' to sides 48 and 48' of the intermediate section 49. These links 78 and 78' have their other ends pivoted at 81 and 81' to intermediate points of locks 82 and 82', which are pivoted at 83 and 83' to center points of sides 65 and 65' on the connecting section 66. Locks 82 and 82' have, at their free ends, outwardly turned flanges 84 and 84', which engage the overlapping portions of the sides on intermediate section 49 and connecting section 66 where these sides overlap as at pivot 64. Thus, engagement of locking flanges 84 and 84' over the pivotal connections for the intermediate section 49 and the connecting section 66 locks these sections in horizontal co-planar relation when they are unfolded to bed position.

At the outer or upper end of the intermediate section, sides 65 and 65' are pivoted at 86 and 86' to sides 87 and 87' of a front spring section 88. The forward ends of sides 87 and 87' are connected by a front crosspiece 89 completing the framework for the front section 88. To support the front section when it is unfolded to bed position, legs 91 and 91' are pivoted to sides 87 and 87' near the forward ends thereof. Legs 91 and 91' have levers extending to the opposite sides of their pivots which are operated by links 92 and 92' pivoted at 93 and 93' to sides 65 and 65' of the connecting section 66 and also pivoted at 95 and 95' to the levers on the legs 91 and 91'. When in bed position, the legs 91 and 91' extend vertically downward from the front section 88 to support the front section on the floor. When folded to seat position, links 92 and 92' move the levers on legs 91 and 91' toward the forward end of the front section 88, thereby folding the legs 91 and 91' about their pivots toward the rear of the front section 88 to the position as shown, for example, in Figure 1.

In order that the seat of the sofa will not be too high, it is necessary that connecting section 66 be slightly shorter than the double thickness of the mattress. When in seat position, the mattress 100 has its rear portion vertically disposed in the chamber behind back panel 31 and posts 26 and 26'. The central portion of the mattress is horizontally disposed on intermediate spring section 49. The forward end portion of the mattress is folded over the intermediate portion so

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the double thickness is confined between the horizontally disposed intermediate section 49 at the bottom of the base frame and superimposed front section 88. In order that the seat of the sofa will be sufficiently low, the length of connecting section 66 is somewhat shorter than twice the thickness of the mattress. For this reason, the mattress is slightly compressed between the front section 88 and the intermediate section 49. To retain the front section 88 compressed downwardly on the mattress, locking lugs 97 and 97' extend at an angle upwardly and forwardly on sides 87 and 87', from points adjacent pivots 85 and 86'. When the spring sections are folded from their bed position to seat position, front section 88 is first folded to a position normal to connecting section 66. Then, connecting section 66 is turned about its pivots to a position normal to intermediate section 49. During this latter folding operation, links 78 and 78' move locks 82 and 82' toward front section 88 so outwardly turned locking flanges 84 and 84' slide over and engage the edges of lugs 97 and 97' to lock the front section 88 in its position normal to connecting section 66 until such time as connecting section 66 is unfolded from its seat position normal to intermediate section 49.

The heavy coil spring construction normally used in sofas requires a seat spring frame. In ordinary sofas this frame is fastened as a part of the sofa framework. In sofa beds heretofore in use, the heavy coil spring cushion was not used because a suitable framework had not been provided. Heretofore, the removable seat cushion has rested upon the folded bed spring and mattress; the mattress forming a support for the seat cushion. With this arrangement, the front of the cushion has rested upon a rigid cross rail of the sofa framework. Hence the seat has not been comfortable. In accordance with the present invention, a full coil seat spring 101 is supported on a seat spring frame 102. This provides complete seating comfort including a "spring-edge" below the front of the cushion.

Sides 103 and 103' of the seat spring frame 102 are connected at their front ends by a seat frame cross member 104. The rearward ends of sides 103 and 103' are pivoted, as by pivot 105, to bracket members 71 and 71' of the bracket 68 projecting from connecting section 66. Sides 103 and 103' of the seat spring frame are slidably coupled to the forward end of sides 87 and 87' of the front bed spring section as by guides 106 and 106', which have their ends folded over, as shown, for example, at 107 in Figure 8, to form a groove for retaining the seat spring frame 102 slidably connected with the front bed spring section 88. When in seat position, as shown in Figure 1, for example, the pivotal connections of seat frame sides 103 and 103' to brackets 71 and 71' are positioned so the seat frame rests upon the members forming the frame of front spring section 88. Thus, pivot 93, when the folding spring unit is in seat position, holds the seat frame in a plane adjacent and parallel to the plane of the front bed spring section 88. When the spring sections are unfolded to their co-planar bed position, bracket members 71 and 71', being spaced from the plane of connecting section 66, by their pivotal connections to sides 103 and 103', cause the seat spring frame to slide forwardly with respect to the front section 88 and, also, to move downwardly from the plane of the front section 88. Couplings 106 and 106' are sufficiently loose to permit the sides 103 and 103' to have their

pivoted ends moved downwardly by bracket members 71 and 71'.

The mattress 100 has its forward end fastened to crosspiece 104 of the seat spring frame as by a loop 113 of cloth secured to the lower front edges of the mattress (Figure 11) and passing around cross member 104 (Figure 7). Forward sliding movement of the seat spring frame pulls the mattress forwardly and, in effect, elongates the spring support for the mattress. At its rear end mattress 100 is attached to a narrow strip 108 extending across the spring and having a loop 108' surrounding a cable 109. Opposite ends of cable 109 are connected by helical spring 110 and 110' to pivots 46 and 46'.

If the seat spring frame 102 were to remain in contact with the front bed spring section 88, as is the case when the parts are in seat position, the heavy bed spring frame would confine the spring of the front bed spring section 88 and prevent downward movements thereof. However, by moving the pivoted end of seat spring 102 downwardly with respect to front section 88, the bed spring of front section 88 has complete freedom of movement in bed position and yet provides a stable support for the seat spring when in seat position.

When in bed position, the bed spring sections are arranged in co-planar relation so they support a conventional link type bed spring connected by coil springs 111 to apertures 112 in the sides of the bed spring sections as well as rear member 44 and front cross member 89. The links of the spring permit the sections to be folded to seat position or unfolded to bed position as desired. In most sofa beds, the mattress is secured to the spring section which folds into superimposed relation below the sofa seat. According to the present invention, the front of the mattress is fastened, as at 113, to crosspiece 104 of the seat spring frame 102. When in seat position, the crosspiece 104 of the seat spring frame is positioned adjacent cross member 89 of the front bed spring section 88. Thus, mattress 100 has its front end coinciding approximately with the front of the front bed spring section 88. Due to the retraction of the seat spring section 102 and the folding of the mattress 100 between the front and intermediate bed spring sections, the rear end of the mattress projects some distance above rear crosspiece 44 of the rear bed spring section 42. When in this position, the mattress is compressed between the front and intermediate bed spring sections and the front section is locked by locks 82 and 82' to hold it rigidly compressing the mattress. With this arrangement, front bed spring section 88 provides a sturdy support for seat spring frame 102 upon which the heavy coil spring construction of cushion 101 may be supported. To unfold the spring sections from their seat position as shown in Figure 1, the first step is to raise the forward part of the folded assembly to a position as illustrated in Figure 2. When a slight upward pressure is applied to cushion 101 or crosspiece 73, springs 54 and 54' become effective to supply most of the force necessary to raise the assembly. After being raised to the position shown in Figure 2, springs 54 and 54' are further effective to swing the assembly forwardly until arms 45 and 45' are moved from the horizontal position of Figure 1 to the vertical position of Figure 3, and side pieces 43 and 43' of the rear spring section 42 are horizontally disposed. Also, intermediate bed spring section 49 is lifted from its position at the bottom of the base frame to a raised position co-planar with

the rear section 43 by the swinging support of links 51 and 51'. Also, legs 57 and 57' are turned about their pivots to support the forward ends of intermediate section 49 by operation of levers 61 and 61' through links 63 and 63'. As illustrated in Figure 3, the locking flanges 84 and 84' are still effective to hold the front section 88 in position compressing the folded portions of the mattress 100. It is not possible to unfold the front section 88 with respect to the connecting section 66 until after the connecting section 66 is unfolded with respect to intermediate section 49. After being moved to the position shown in Figure 3, the operator may grasp crosspiece 104, to further unfold the sections of the bed spring. By lifting crosspiece 104, sides 65 and 65' of the intermediate section 66 will be turned about their pivots to a position co-planar with intermediate section 49. During this operation, links 78 and 78' remove locking members 82 and 82' from engagement with lugs 97 and 97' to unlock the front section 88. When unfolded to the position shown in Figure 4, locking flanges 84 and 84' serve their second purpose of engaging the overlapping sides of the intermediate and connecting bed spring sections above their pivotal connections to retain these sections in co-planar relation.

After the parts have reached the position illustrated in Figure 4, the front bed spring is further unfolded, having been released from locks 82 and 82'. As the front section 88 is turned about pivots 86 and 86', seat frame 102 slides forwardly through guides 106 and 106', thereby pulling the mattress 100 forwardly until its rear end is coincident with the rear crosspiece 44. Also, turning of front section 88 causes sides 103 and 103' of the seat spring frame 102 to become separated from the plane of the front bed spring section 88 and assume a position angularly disposed between the pivotal connections on bracket members 71 and 71' and guides 106 and 106'. Thus, the pivotal connection of the seat spring frame to the bracket 68, which is spaced from the plane of the connecting section 66, serves to elongate the effective spring arrangement supporting the mattress 100, and, also, to separate the seat spring from the bed spring, permitting freedom of movement for the latter.

In returning the folding spring unit to its seat position, the front section is first folded to the position shown in Figure 4. Retraction of the seat spring frame 102 and folding of the mattress 100 causes the rear end of the mattress to slide rearwardly beyond the rear end of the spring. This movement of the mattress is guided and aided by cable 109. At this point, front legs 91 and 91' are folded to their position alongside the front spring section and the seat spring frame is moved to its position adjacent the front spring section 88. Next, the connecting section 65 is turned to its position normal to the intermediate section 49. This operation causes locks 82 and 82' to engage lugs 97 and 97', thereby locking the front spring section 88 in position superimposed over the intermediate section 49 with the folded mattress compressed between these two sections. Finally, the intermediate section 49 and rear section 42 are shifted on their arms to their seat positions, as shown in Figure 1, with the intermediate section at the bottom of the base frame and the rear section vertically disposed behind the back sofa panel. During this folding step, cable 109 serves as a pivot about which strip 108 turns so the mattress is guided to its vertical position. When the parts reach

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this position, rubber bumpers 115 and 115' engage rests 116 and 116' secured to posts 39 and 39', respectively. Thus, the seat spring frame has one end supported by bracket members 71 and 71' connected to crosspiece 73 which rests upon front rail 23 of the sofa framework. The other end of the seat spring frame rests upon the front bed spring section which is supported by bumpers 115 and 115'. A removable cushion 120 may then be placed upon the seat spring to complete the sofa seat.

It will be apparent that the seat spring provides a base for the seat cushion, whether or not the mattress is present on the bed spring. The seat spring frame rests on front rail 23 and bumper 115, so it forms a rigid base for the sofa seat. Above rail 23 and crosspiece 104, the seat springs form a "spring-edge" support for sofa cushion 120, so the seating comfort compares with that of a conventional sofa and surpasses the seating comfort of folding sofa beds now in use.

What is claimed is:

1. In a foldable spring unit for a sofa bed, a front bed spring section, a short connecting bed spring section having its opposite ends respectively pivoted to said front bed spring section and another bed spring section, so said front section may be folded into seat position superimposed upon said other section or unfolded to bed position co-planar with said other section, a seat spring frame slidable on said front section, and means connected between said connecting section and said seat spring frame operated by folding said front section to seat position relative to said connecting section for retractably sliding said seat spring frame toward said connecting section and operated by unfolding said front section to bed position relative to said connecting section for extendably sliding said seat spring frame away from said connecting section.

2. In a foldable spring unit for a sofa bed, a front bed spring section, a short connecting bed spring section having its opposite ends respectively pivoted to said front bed spring section and another bed spring section, so said front section may be folded into seat position superimposed upon said other section or unfolded to bed position co-planar with said other section, a seat spring frame connected to and movable toward and away from the plane of said front section, and means connected between said connecting section and said seat spring frame operated by folding said front section to seat position relative to said connecting section for moving said seat spring section toward the plane of said front section and operated by unfolding said front section to bed position relative to said connecting section for moving said seat spring frame away from the plane of said front section.

3. In a foldable spring unit for a sofa bed, a front bed spring section, a short connecting bed spring section having its opposite ends respectively pivoted to said front bed spring section and another bed spring section, so said front section may be folded into seat position superimposed upon said other section or unfolded to bed position co-planar with said other section, a seat spring frame on said front section movable longitudinally of said front section toward and away from said connecting section and toward and away from the plane of said front section, and means connected between said connecting section and said seat spring frame operated by folding said front section to seat position for re-

tractably moving said seat spring frame toward said connecting section and toward the plane of said front section and operated by unfolding said front section to bed position for extendably moving said seat spring frame away from said connecting section and away from the plane of said front section.

4. In a foldable spring unit for a sofa bed, a front bed spring section, a short connecting bed spring section having its opposite ends respectively pivoted to said front bed spring section and another bed spring section, so said front section may be folded into seat position superimposed upon said other section or unfolded to bed position co-planar with said other section, a seat spring frame slidable on said front section, locking means on said connecting section operated by folding said connecting section to seat position relative to said other section for preventing pivotal movement of said front section relative to said connecting section, and means operated by folding said front section to seat position for retractably sliding said seat spring frame toward said connecting section and operated by unfolding said front section to bed position for extendably sliding said seat spring frame away from said connecting section.

5. In a foldable spring unit for a sofa bed, a front bed spring section, a short connecting bed spring section having its opposite ends respectively pivoted to said front bed spring section and another bed spring section, so said front section may be folded into seat position superimposed upon said other section or unfolded to bed position co-planar with said other section, a seat spring frame connected to and movable toward and away from the plane of said front section, locking means on said connecting section operated by folding said connecting section to seat position relative to said other section for preventing pivotal movement of said front section relative to said connecting section, and means operated by folding said front section to seat position for moving said seat spring section toward the plane of said front section and operated by unfolding said front section to bed position for moving said seat spring frame away from the plane of said front section.

6. In a foldable spring unit for a sofa bed, a front bed spring section, a short connecting spring section having its opposite ends respectively pivoted to said front section and another bed spring section, so said front section may be folded into seat position superimposed upon said other section or unfolded to bed position co-planar with said other section, a bracket rigidly mounted on said connecting section spaced from the plane thereof, and a seat spring frame having one end pivoted to said bracket beyond the pivotal connection of said connecting section with said front section and its other end slidably coupled to said front section near the free end thereof.

7. In a foldable spring unit for a sofa bed, a front bed spring section, a short connecting spring section having its opposite ends respectively pivoted to said front section and another bed spring section, so said front section may be folded into seat position superimposed upon said other section or unfolded to bed position co-planar with said other section, a locking member pivoted on said connecting section, and a link connected to said other section and said member for moving said member to lock said front section with said connecting section upon

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folding movement of said connecting section relative to said other section, a bracket on said connecting section spaced from the plane thereof, and a seat spring frame having one end pivoted to said bracket and its other end slidably coupled to said front section near the free end thereof.

8. In a foldable spring unit for a sofa bed, a connecting bed spring section, a front bed spring section having one end pivotally connected to one end of said connecting section, another bed spring section having one end pivotally connected to the other end of said connecting section, said bed spring sections being arranged so said front bed spring section may be folded to seat position superimposed upon said other section and unfolded to bed position with said sections arranged in co-planar relation, a lock pivoted on said connecting section, and means operable by folding movement of said connecting section relative to said other section for moving said lock to retain said front section in folded position relative to said connecting section.

9. In a foldable spring unit for a sofa bed, a front bed spring section, another bed spring section, a short connecting bed spring section having its opposite ends respectively pivoted to said front section and said other section, a lug on said front section near the pivoted end thereof, a lock pivoted on said connecting section for engaging said lug, and a link pivoted to said other section and said lock operated by pivotal movement of said connecting section relative to said other section for moving said lock relative to said lug.

10. In a foldable spring unit for a sofa bed, a front bed spring section, another bed spring section, a short connecting bed spring section having its opposite ends respectively pivoted to said front section and said other section, a lug on said front section adjacent its pivotal end and projecting from the plane thereof, a locking member pivoted on said connecting section intermediate the ends thereof, a flange on said locking member for engaging said lug when said sections are folded to bed position and for engaging said other section when said sections are unfolded to hold said connecting section and said other section in co-planar relation, and a link pivoted to said other section and said member for operating said member.

11. A folding spring for a sofa bed comprising a base frame, a rear bed spring section supported on said frame to swing between a seat position vertically disposed behind the sofa back and a horizontal bed position, an intermediate bed spring section pivotally connected to said rear section and supported on said frame to swing between a seat position horizontally disposed below the sofa seat and a bed position forwardly disposed and co-planar with said rear section, a short connecting bed spring section pivotally connected to the forward end of said intermediate section to fold between a seat position substantially normal to the plane of said intermediate section and a bed position co-planar with said intermediate section, a front bed spring section pivoted to said connecting section to fold between a seat position substantially normal to said connecting section and a bed position co-planar with said connecting section, a seat spring frame slidably coupled to said front section, and means connected between said connecting section and said seat spring frame for moving said

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seat spring frame by folding said front section relative to said connecting section.

12. A folding spring for a sofa bed comprising a base frame, a rear bed spring section supported on said frame to swing between a seat position vertically disposed behind the sofa back and a horizontal bed position, an intermediate bed spring section pivotally connected to said rear section and supported on said frame to swing between a seat position horizontally disposed below the sofa seat and a bed position forwardly disposed and co-planar with said rear section, a short connecting bed spring section pivotally connected to the forward end of said intermediate section to fold between a seat position substantially normal to the plane of said intermediate section and a bed position co-planar with said intermediate section, a front bed spring section pivoted to said connecting section to fold between a seat position substantially normal to said connecting section and a bed position co-planar with said connecting section, a bracket fixed to and projecting from said connecting section in a forward direction when in seat position, and a seat spring frame having one end pivoted to said bracket above the pivotal connection of said front section with said connecting section and its other end movably coupled to said front section.

13. A folding spring for a sofa bed comprising a base, posts extending upwardly from opposite sides near the rear of said base, a rear bed spring section, links fixed to opposite sides of said section and respectively pivoted to said posts, an intermediate bed spring section pivoted to said rear section, links pivoted to opposite sides of said base forwardly of said posts and pivoted to said intermediate section to swingably support the same, a front bed spring section, a short connecting bed spring section having its opposite ends respectively pivoted to said intermediate and front sections, rigid brackets projecting from opposite sides of said connecting section, and a seat spring frame pivoted to said brackets beyond the pivotal connection of said connecting section with said front section and slidably connected to said front section, said sections being foldable between a seat position with said rear section vertically disposed behind the sofa back, said intermediate section horizontally disposed below the sofa seat, said connecting section vertically disposed with its brackets projecting forwardly below the front of the sofa seat, said front section being superimposed over said intermediate section with said seat spring frame lying substantially in the plane of said front section, and a bed position with said sections horizontally disposed in co-planar relation with said seat spring frame shifted below said front section and extended beyond the free end thereof.

14. In a foldable spring unit for a sofa bed, a front bed spring section, another bed spring section, a short connecting bed spring section having its opposite ends respectively pivoted to said front section and said other section, said bed spring sections being arranged so said front bed spring section may be folded to seat position superimposed upon said other section and unfolded to bed position with said sections arranged in co-planar relation, a bracket rigidly mounted on said connecting section spaced from the plane of said connecting section and extending toward said front section beyond the end of said connecting section, and a seat spring frame having one end movably coupled to said front

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section and the other end pivoted to said bracket beyond the pivotal connection of said connecting section to said front section.

15. In a foldable spring unit for a sofa bed, a front bed spring section, another bed spring section, a connecting section having its opposite ends pivotally connected to said sections, a pair of brackets, one mounted on each side of said connecting section, a sofa front member extending between said brackets parallel to said connecting section, and a seat spring having one end movably coupled to said front section and its other end pivoted to said brackets above the upper edge of said sofa front member.

16. In a foldable spring unit for a sofa bed, a front bed spring section, a short connecting bed spring section having its opposite ends respectively connected to said front bed spring section and another bed spring section, so said front section may be folded into seat position superimposed upon said other section or unfolded to bed position co-planar with said other section, a seat spring frame slidably coupled to said front section, a mattress connected to said seat frame, and means operated by folding said front section to seat position for retractably sliding said seat spring frame and said mattress toward said connecting section and operated by unfolding said front section to bed position for extendably sliding said seat spring frame and said mattress away from said connecting section.

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17. In a foldable spring unit for a sofa bed, a front bed spring section, another bed spring section, a connecting section having its opposite ends pivotally connected to said sections, a seat spring frame slidably coupled to said front section, a cross piece on said seat spring frame movable from a retracted position adjacent the free end of said front section to an extended position spaced from said free end, and means connected between said connecting section and said seat spring frame operated by folding said front section to seat position for retracting said frame and said cross piece and operated by unfolding said front section to bed position for extending said frame and said cross piece.

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